PRIMARY LARVAE OF CISSITES ASSOCIATED WITH NEW WORLD CARPENTER BEES

(Coleoptera-Meloidae: Hymenoptera-Xylocopidae)

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Recently several authors, Enns (1958), Selander (1959), and Selander and Bouseman (1960) have published extensive collection records of the adults of the two New World species of *Cissites*. Independently my colleague, Paul D. Hurd, Jr., has discovered numerous first instar larvae of these same species clinging to the hairs of their host bees, *Xylocopa* species. These byproducts of his study of the New World carpenter bees are gratefully acknowledged and form the basis for the following contribution. He is responsible for the identification of the carpenter bees reported herein.

Since *Cissites maculata* (Swederus) is the only species known to occur in South America and *Cissites auriculata* (Champion) is the dominant species encountered in Mexico, it was possible to determine which of the two dominant larval types was associated with the two adult forms. The primary larvae of these two species are very similar and can be separated best by a minor difference in the relative lengths of the setae in the posterior marginal rows of the metasomal tergites. These differences are more pronounced on the anterior tergites as indicated by the following key:

Primary larvae with third pair of setae of posterior marginal row on metasomal tergites one to five subequal in length to median pair of setae of same row.....*auriculata*

Primary larvae with third pair of setae of posterior marginal row on metasomal tergites one to five considerably longer than median pair of setae of same row.....*maculata*

Some or all of the primary larvae were removed from the adult bees and mounted on slides in diaphane. These slides will be returned to the institutions which furnished the adult bees to Dr. Hurd.[1] Abbreviations for these institutions for use in the distribution records are as follows: American Museum of Natural History (A.M.N.H.); Academy of Natural Sciences, Philadelphia (A.N.S.P.); California Academy of Sciences (C.A.S.); California Insect Survey, University of California, Berkeley (C.I.S.); Cornell

[1] The exact label data of each bee is recorded on the slides and is given in the distributional records cited below. The position of the larvae on the bees was extremely variable and, therefore, is not recorded.

University (C.U.); Kansas University (K.U.); Los Angeles County Museum (L.A.C.M.); Museum of Comparative Zoology, Harvard University (M.C.Z.); United States National Museum (U.S.N.M.); and University of California, Riverside (U.C.R.).

CISSITES AURICULATA (Champion)

MEXICO: *Xylocopa cyanea* Smith, ♂, Ixtapan de la Sall, Mex., Mexico, 5500 feet, VIII-9-1954, 1 larva (K.U.); *Xylocopa fimbriata* Fabricius, ♀, Vera Cruz, Mexico, II-12-54. R. R. Dreisbach, 1 larva, (K.U.); *Xylocopa guatemalensis* Cockerell, ♂, Cuernavaca, Mexico, Nov. 5, 1922, E. G. Smyth, 136 larvae (U.S.N.M.); *Xylocopa guatemalensis* Cockerell, ♀, 15 mi. S. Cuernavaca, Mexico, XI-15-46, F. E. Skinner, collector, 27 larvae, (U.C.R.); *Xylocopa guatemalensis* Cockerell, 2♀, 20 mi. S. Taxco, Mexico, II-6-54, R. R. Dreisbach, 2 larvae, (K.U.); *Xylocopa mexicanorum* Cockerell, ♀, Chilpancingo, Guerrero, Mexico, June 30, 1951, P. D. Hurd, collector, 2 larvae, (C.I.S.).

HONDURAS: *Xylocopa fimbriata* Fabricius, ♀, Zamorano, 20 mi. from Tegucigalpa, Rep. Honduras, T.D.A. Cockerell, 24 larvae, (M.C.Z.).

An unrecorded adult of *C. auriculata* was collected by P. H. Timberlake at Alamos, Sonora, Mexico, on January 7, 1951 and is in the collection of the University of California at Riverside. This specimen extends considerably the known distribution of this species in northwestern Mexico.

The suggestion of Selander and Bouseman (1960) that *Cissites* may oviposit in the burrows of the host bee, as is the case in the related Old World species, *Synhoria testacea* (Fabricius), appears likely from the small number of *Xylocopa* species associated with larvae of *Cissites* in the present paper, the number of times that larvae have been taken on males and females of a single bee species and the large number of larvae (136, 27, 24) that occur on an individual bee. In nemognathine meloid genera which oviposit on flowers, the larvae cling to a variety of flower-visiting insects but never in large numbers on any one insect. By contrast larvae of the genus *Hornia,* which oviposits in the burrow of its host bee, may occur in large numbers on single bees. MacSwain (1958) has recorded 20, 29, 37, and 131 larvae of *Hornia* on four adults of the host bee, *Anthophora marginata* Smith. It seems likely that the four species of *Xylocopa* noted above will prove to be hosts of *Cissites auriculata.* The two associations with *Xylocopa fimbriata* are of particular interest since in Panama this bee, as noted below, also is associated with *Cissites maculata.*

CISSITES MACULATA (Swederus)

ARGENTINA: *Xylocopa augusti* Lepeletier, ♀, Buenos Aires, Arg., II-1950, M. Senkute, 1 larva, (K.U.). *Xylocopa ciliata* Burmeister, ♀, San Pedro de Colalao, Trancas, Tucuman, Arg., II-1950, Arnau, J. Foerster, 1 larva, (K.U.). *Xylocopa nigrocincta* Smith, 3♀, Rep. Argt., Terr. Formosa, Gran Guardia, (2) I-20-53, (1) III-53, J. Foerster, collector, 4 larvae, (K.U.). *Xylocopa splendidula* Lepeletier, ♀, La Rioja, Argentina, S.A., Ac. 5165, 1 larva, (A.M.N.H.); ♂, La Rioja, W. Argentina, B. P. Clark, donor, 4 larvae, (U.S.N.M.); ♀, La Rioja, Argentina, E. Giacomelli, 7 larvae, (C.U.).

BRAZIL: *Xylocopa frontalis* (Olivier), ♂, Corupa (Hansa-Humboldt), S. Cath., Brazil, X-44, A. Maller, collector, Frank Johnson, donor, 3 larvae, (A.M.N.H.); ♀, Annapolis (Anápolis, Brazil), Goiaz, VII-3-36, G. Fairchild, collector, 12 larvae, (M.C.Z.); ♀, S. Bento, D. Caxias, Est. Rio de Janeiro, Brasil, XI-1953, P. A. Teles, collector, 1 larva, (K.U.); ♀, 24 kil. E. Formoso, Go., Brazil V-17-1956, M. and P. Machlis, collectors, 6 larvae, (L.A.C.M.). *Xylocopa grisescens* Lepeletier, ♀, Ceara, Serra de Baturite, 600 m., 25-7-08, Ducke, P. Herbst collection, Ex. Reed, 2 larvae, (C.A.S.). *Xylocopa nigrocincta* Smith, ♀, S. Bento, Duque de Caxias, Est. do Rio, Brasil, VII-11-954, P. A. Teles, 1 larva, (K.U.). *Xylocopa ordinaria* Enderlein, ♀, S. Bento, Duque de Caxias, Est. do Rio Brasil, VI-24-954, P. A. Teles 3 larvae, (K.U.); *Xylocopa varians varians* Smith, 2♂, Nova Teutonia, Santa Caterina, Brazil, XII-1951, L. E. Plaumann, 5 larvae, (K.U.).

COLOMBIA: *Xylocopa frontalis callichlora* Cockerell, ♀, Hacienda Garcia, Cauca Valley, Colombia, I-27-35, W. Eder, collector, 1 larva, (A.M.N.H.)

PERU: *Xylocopa bruesi* Cockerell, ♀, 35 mi. E. of Abancay, Peru, III-5-51, Ross and Michelbacher, collectors, 1 larva, (C.A.S.). *Xylocopa lehmanni* Friese, ♀, Huanta, Peru, III-8-1951, Ross and Michelbacher, collectors, 4 larvae, (C.A.S.).

URUGUAY: *Xylocopa augusti* Lepeletier, ♀, Uruguay, J. Wyman, 1 larva, (M.C.Z.); ♀, Florida, Uruguay, I-1952, J. Foerster, 1 larva, (K.U.).

GALAPAGOS ISLANDS: *Xylocopa darwini* Cockerell, ♀, S. Seymour Island, Galapagos, numerous larvae, (M.C.Z.).

PANAMA: *Xylocopa fimbriata* Fabricius, ♀, Old Panamá, Panamá, IV-19-45, C. D. Michener, I larva, (A.M.N.H.); 2♀, Panamá, Saboga (Taboga?) Island, Apr. 1904, W. W. Brown Jr., J. E. Thayer Expd., 2 larvae, (M.C.Z.).

MEXICO: *Xylocopa frontalis nautlana* Cockerell, ♀, Simojovel, Chiapas, Mexico, VIII-5-58, J. A. Chemsak, collector, 9 larvae, (C.I.S.).

WEST INDIES: *Xylocopa mordax* Smith, 2♀, San Domingo, 5 larvae, (A.N.S.P.); ♀, La Vega, R. Dom., V-14-15, 2 larvae, (A.M.N.H.); ♀, Bizeton, Haiti, I-9-'22 F.4613, 2 larvae, (A.M.N.H.); ♀, Fond Parisien, Haiti, II-18-'22, about 60 ft. alt., F.4634, 4 larvae, (A.M.N.H.); ♀, Pivert, Haiti, IV-1-'22, about 250 ft. alt., F.4657, 3 larvae, (A.M.N.H.).

The last record of *Cissites maculata* from Mexico appears to be that of Champion (1892). The specimen from Simojovel, Chiapas, Mexico, is also of interest because of the association

with *Xylocopa frontalis*, a species with which the meloid has been taken in Brazil and Colombia.

The larvae from the Galapagos Islands are unique in being larger than those from any other source. Although this size difference is probably significant, all of these larvae (more than one hundred) were clinging to a single female of *Xylocopa darwini* and may be the progeny of a single *C. maculata*.

Identification of the larva from Old Panama is not certain. While the larvae removed from the two females of *Xylocopa fimbriata* from Taboga Island are unmistakably *C. maculata* the other larva is aberrant. The median setae are of unequal length on the two sides of the metasoma and the species might be *C. auriculata*. In either event, it is clear that *X. fimbriata* is the host of both species of *Cissites*. The present associaion of these meloids with a number of carpenter bee hosts should greatly facilitate future biological studies.

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